



Looking for a new investment angle?

A developer's
guide to environmentally
smart buildings

Benefits

Investing in environmentally smart buildings means investing in the future.

Smart buildings are highly marketable, with benefits for developers and investors. Developers can also increase their market edge by promoting the benefits for occupiers. These include:

- a comfortable and healthy work environment
- attractive to clients, customers and employees
- protection against environmental legislation
- improved productivity
- reduced pollution.

These buildings make intelligent use of resources, such as energy and water, while minimising waste. They not only have a reduced need for mechanical plant but also outperform conventionally designed buildings in many areas, including heating, lighting and ventilation.

All of this adds up to energy-efficient and environmentally conscious buildings that maintain the desired comfort conditions for occupants, while minimising the impact on the environment.

This Guide demonstrates with the use of case studies how businesses have already taken advantage of the benefits of these new-build and refurbished buildings.

Reduced investment risk and improved rental income

Increased lettable area and flexibility

Lower construction costs

Enhanced company image

Improved marketability through improved working environment



This Guide is written for developers, property investors and agents, and produced as part of the Government's Energy Efficiency Best Practice programme.

Case studies



1 THE HELICON, CITY OF LONDON

A speculative office and retail development which let at an average rent of £441 per m² (£41 per ft²) and was sold by London and Manchester Assurance in 1998 to Cin LaSalle for £82 million. The development has a high gross to net floor area ratio, high levels of flexibility for office layout changes, and low service charges to attract tenants and thus increase speed of let.

Smart features

- Triple-glazed ventilated façade
- Chilled-ceiling and displacement ventilation
- Chlorofluorocarbon (CFC)-free and hydrochlorofluorocarbon (HCFC)-free refrigerants to reduce the impact of future legislation



2 DTI HEADQUARTERS, 1 VICTORIA STREET, LONDON

The building refurbished by Legal and General and leased back to the DTI provides 25% more lettable floor area than the original. This was achieved by replacing obsolete plant and services with smaller and more energy-efficient equipment. Future changes in office layout can readily be accommodated by the flexible ventilation system which allows for the floor supply grilles to be repositioned easily.

Smart features

- Mixed-mode, allowing anything between natural ventilation and full displacement ventilation with cooling from a chilled ceiling



3 LEEDS CITY OFFICE PARK, MEADOW LANE, LEEDS

Construction costs for British Gas Properties' development in Leeds were 5% less than if air-conditioning had been installed. Cellnet has leased the building and is currently installing a chilled-ceiling system tailored exactly to their needs.

Smart features

- Can be operated with natural ventilation
- Contingency for air-conditioning to be added by tenants if needed

4 THE BODY SHOP HEADQUARTERS, LITTLEHAMPTON

The building meets both the developer's and the occupier's objectives. It takes account of the environmental commitment at the core of The Body Shop's ethical business stance while the developer, Store Property Investments, wanted flexibility for future letting should The Body Shop move site.

Smart features

- Energy efficiency and flexibility by avoiding central ventilation plant
- Staff have a high degree of control over their work environment
- Energy performance compares well against energy consumption benchmarks



5 EDINBURGH GATE, HARLOW

The working environment was at the forefront of the brief for Addison Wesley Longman. When surveyed on what they regarded as important features for a new building, 80% of staff at Longman listed windows that open. The 15 300 m² (160 000 ft²) building was completed in 1995 and in 1996 was sold to Hypobank on a leaseback deal, with the Pearson group (the holding group for Longman) taking a 25-year lease.

Smart features

- Naturally ventilated
- Openable windows, plenty of daylight and external views to suit staff wishes





'Environmental issues were an inherent aspect of the development process for the Helicon Building, which contributed to its commercial success.'

*David Low
London and Manchester Assurance*



'Occupiers and investors are becoming increasingly aware of the environmental cost of building occupation. This is typically illustrated by the DTI's requirements for 1 Victoria Street. Legal and General see the greening of commercial buildings taking a higher profile in the future occupation and investment markets.'

*Tim Varley, Associate Director
Legal and General Investment Management – Property*



'Being at the forefront of the mobile communications revolution has specific demands on our property portfolio. This was indeed the case in Leeds where we needed to meet an operational requirement to provide a 24-hour call centre. Fitting out this building was like starting with a clean sheet. It was refreshing for the project team not to have to strip out or be constrained by existing service installations.'

*Neil Cubitt
Property Engineering Manager, Cellnet*



'This building meets the environmental objectives of our tenant whilst providing a valuable addition to our portfolio.'

*Mike Standing, Construction Director
Store Property Investments Ltd*



'If workers are unhappy with their environment this can result in absenteeism. Two days lost productivity is approximately equivalent to over a month's worth of operation costs.'

*Work Place Environments and Employee Productivity
Office Life, June 1997, p12*

Realising the benefits



Reduced investment risk and improved rental income

Environmental issues are increasingly forming a greater part of development and investment risk appraisals. For instance, in the past, conventional air-conditioning has been considered a 'safe haven' in terms of investment risk; this is a common misconception.

There are many reasons why environmentally smart buildings reduce the investment risk associated with conventional air-conditioned buildings.

Environmentally smart buildings are:

- better equipped for increasing UK and European environmental targets
- more favourably positioned to respond to fiscal or legislative measures for environmental responsibility
- simpler in construction and have less plant; they should, therefore, depreciate at lower rates compared with conventional air-conditioned buildings
- more robust against building service failures or breakdowns due to simpler plant with less to go wrong.

Environmentally smart buildings could attract a rental premium over conventional air-conditioned buildings. This would be partly in return for lower operational costs and partly due to increased net to gross floor area ratios. The improved rental income could then be translated directly into added investment value.



Increased lettable area and flexibility

The mechanical plant and distribution services for environmentally smart buildings occupy less space than they do for standard air-conditioned buildings, due to the lower dependence on mechanical services, thus enabling higher net to gross floor ratios. Figure 1 indicates possible floor area savings for different systems.

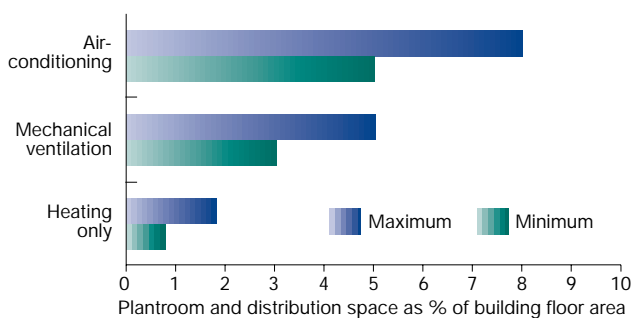


Figure 1 Possible floor area savings for different ventilation systems

(source: CIBSE Applications Manual AM10 'Natural ventilation in non-domestic buildings', 1997, p6)

Environmentally smart buildings can be as flexible as conventional air-conditioned buildings, that are being designed to meet more closely the needs of typical occupiers. Allowing space for additional mechanical ventilation or air-conditioning plant provides flexibility to deal with any future increased cooling requirements, rather than having air-conditioning or oversized plant installed to meet cooling loads that may never occur.

Environmentally smart mixed-mode buildings allow occupiers flexibility to benefit from natural ventilation for much of the year, but also to make use of mechanical ventilation or air-conditioning in hot weather, or in areas of the building with high heat gains from equipment.

Lower construction costs



It is a general misconception that energy-efficient buildings can have high capital costs. Environmentally smart buildings need cost no more to construct than conventional air-conditioned buildings, and offer opportunities for long-term savings.

Environmentally smart buildings are often naturally ventilated or have more efficient cooling systems, which are smaller in size than those required for conventional air-conditioned buildings. The result is:

- reduced construction costs for services
- reduced plant size as a result of passive measures such as shading systems, improved daylighting and exposed structures which absorb heat.

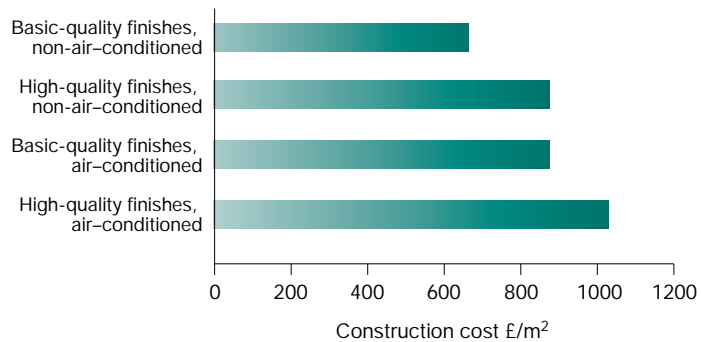


Figure 2 Comparison of construction costs for buildings of more than eight storeys

(source: CIBSE Applications Manual AM10 'Natural ventilation in non-domestic buildings', 1997, p6)

Because air-conditioning systems require updating at times throughout the life of a building, replacement costs will also be lower for environmentally smart buildings as less plant is required.

Figure 2 (as reported by quantity surveyors Gardiner and Theobald) shows that, for the same cost as a new-build air-conditioned building with basic-quality finishes, you could upgrade the specification to a naturally ventilated building with high-quality finishes.

Enhanced company image



Large public companies such as Natwest, J Sainsbury and The Body Shop have benefited from environmental policies that are also reflected in the performance of their building stock.

There are various commercial factors that influence these companies to adopt environmental policies, including:

- efficient use of resources which have an impact on the environment
- cost savings from reduced waste
- improved public relations
- better staff morale
- sound business ethics.

Realising the benefits



Improved marketability through improved working environment

Environmentally smart buildings promote building health through their design, layout, ventilation and heating strategies. The use of daylight and less highly processed construction and furnishing materials can result in a healthier and more pleasant working environment. This, in turn, may result in reduced staff absenteeism and greater commitment to the building and enterprise as a whole.

Air-conditioned buildings are typically designed to control temperatures between 20°C and 22°C, whereas environmentally smart buildings allow temperatures to fluctuate beyond this tight temperature range but within acceptable limits.

Recent research shows that where individuals have control over their environment, for example by opening windows or adjusting blinds, they feel more satisfied with their environment and can tolerate higher room temperatures and still feel comfortable.

In a survey carried out for Richard Ellis (The British Office Market – Harris Research Centre, 1994) the vast majority (96%) of occupants accepted that a well-designed building has a positive effect on staff productivity. Similarly, making the best use of daylighting and providing ventilation via windows rather than air-conditioning were considered the most important design features. When asked directly, 89% of occupants said they preferred buildings without conventional air-conditioning.

In the USA, research has shown that a 1% change in productivity has a similar economic value to the whole of the energy cost. It is, therefore, important to adopt measures that improve productivity.



DESIGN ADVICE

Design Advice is a Government service providing free environmental design guidance to developers and their designers on specific building projects.



Leasing or occupying an environmentally smart building demonstrates a company's environmental commitment, which can be actively promoted in marketing material.

The BRE Environmental Assessment Method (BREEAM) provides an independent assessment of a building's environmental performance and can be used to demonstrate environmental commitment. Since its launch in 1990 it is estimated that 25% of all new office space has been assessed under this voluntary scheme.

Action plan

- *Include energy efficiency and environmental issues in the brief.*
- *Select a design team that understands the issues.*
- *Encourage the design team to take advantage of the Government's Design Advice service.*
- *Consider establishing a target BREEAM rating for the development.*
- *Brief the design team to work to established good practice energy benchmarks (see Energy Consumption Guide 19).*
- *Encourage the design team to work together to explore a range of servicing options.*
- *Ask the design team for a comparison of the construction cost, running cost and comfort implications of suggested options.*
- *Use the building fabric to control heat gains and minimise plant use; opt for simple, tried and tested solutions.*
- *Ensure design changes and cost-cutting exercises do not compromise the environmental performance of the design.*
- *Ensure that the complexity of the systems and controls installed is appropriate to those who are likely to manage them.*
- *Allow sufficient time and resources for commissioning.*
- *Provide guidance to the occupiers on how the building should be used.*

Designing environmentally smart buildings

Developers, investors and occupiers who are procuring new buildings or refurbishing existing ones can implement action plans to ensure that they reap the benefits of an environmentally smart building.

Heating, ventilation and cooling strategies must satisfy the needs of future occupiers. Typical strategies include:

- natural ventilation
- mechanical or passive ventilation in noisy or polluted environments
- energy-efficient air-conditioning where cooling is required
- a combination of the above (mixed-mode).

The flow chart opposite enables you to assess ventilation options for a given site. More detailed sources of information are listed on pages 12 and 13.

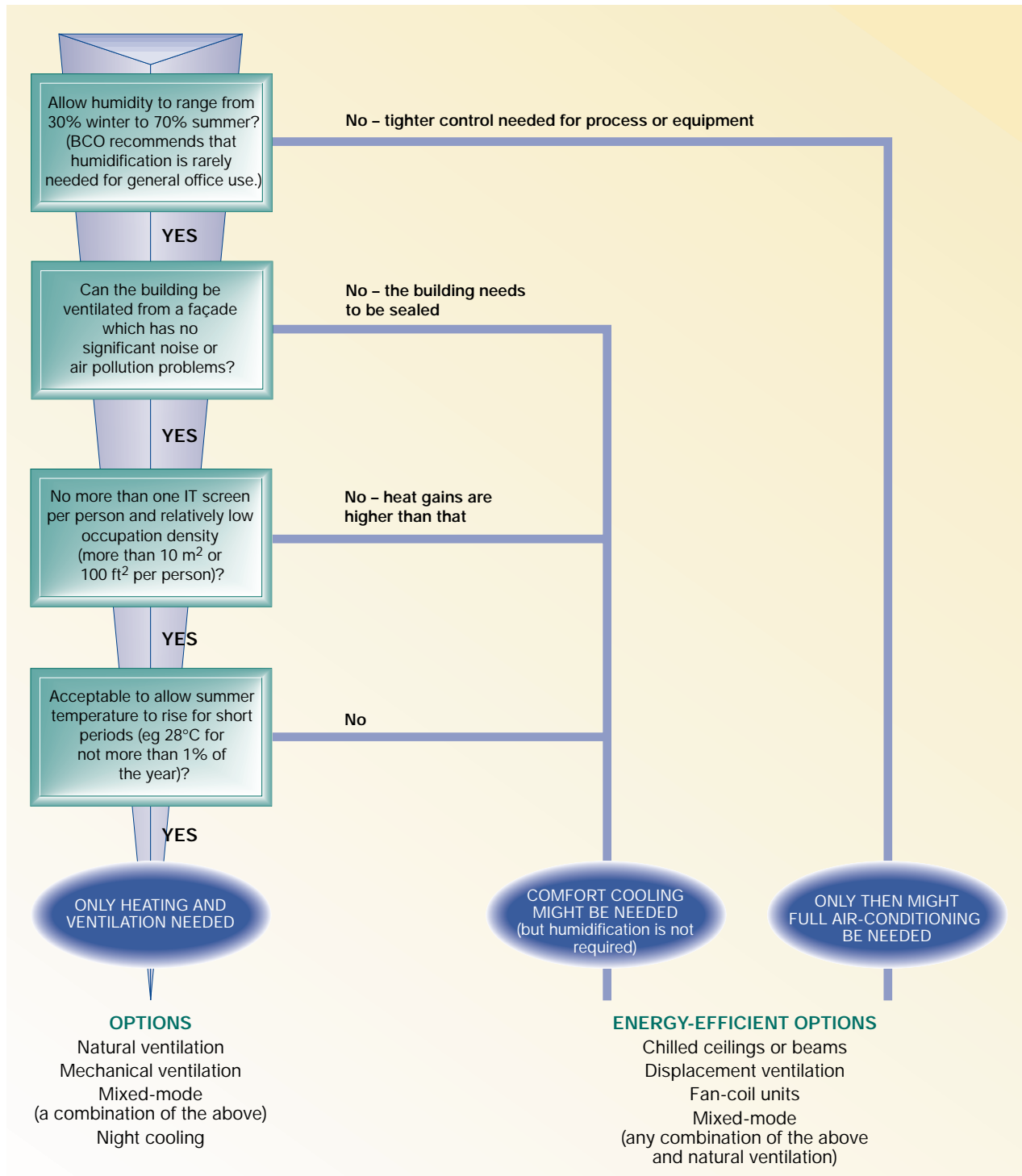
Natural ventilation should be the first option for all office buildings, and should certainly be considered for greenfield sites and business parks where buildings are situated away from traffic fumes and noise, or where ventilation air can be drawn from the side of the building away from the street. Although it may not be appropriate to adopt a natural ventilation strategy in noisy and polluted environments, there are still many opportunities to improve the energy and environmental performance of mechanically ventilated buildings.

Environmentally smart buildings often include the following features in their design:

- careful window design and orientation, to improve daylighting while avoiding overheating
- internal or external shading to control heat gains and glare
- high-performance glazing systems
- exposed ceilings, walls or structure to absorb heat during the day and reduce peak temperatures
- 'night ventilation' to cool the building so that it can reduce overheating the next day
- openable windows to provide ventilation where noise and pollution levels permit
- where cooling is required, more efficient air-conditioning options such as displacement ventilation and chilled ceilings
- improved insulation levels in walls, roof and floors
- narrow floor plates to allow the use of natural ventilation and daylighting
- efficient heating and lighting systems, which are well controlled and easily operated by users.

The resultant building design should be compared to the energy benchmarks published by the Department of the Environment, Transport and the Regions (DETR) in Energy Consumption Guide (ECON) 19 (see page 13 'Further reading' for details).





COST, COMPLEXITY AND MAINTENANCE ALL INCREASE WHEN MECHANICAL COOLING IS INSTALLED

Further information

Design Advice

BRE, Garston, Watford
Hertfordshire WD2 7JR
Tel 01923 664258. Fax 01923 664787
E-mail DesignAdvice@bre.co.uk
Internet <http://www.bre.co.uk/designadvice>

BREEAM

The BREEAM Office
BRE, Garston, Watford
Hertfordshire WD2 7JR
Tel 01923 664462. Fax 01923 664103
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Internet <http://www.bre.co.uk/bre/breeam>

British Council for Offices (BCO)

Shinfield Grange, Cutbush Lane
Shinfield, Reading, Berkshire RG2 9AF
Tel 0118 988 5505. Fax 0118 988 5495
E-mail offices@compuserve.com
Internet <http://www.bco.org.uk>

Royal Institution of Chartered Surveyors (RICS)

12 Great George Street, Parliament Square
London SW1P 3AD
Tel 020 7222 7000. Fax 020 7222 9430
E-mail info@rics.org.uk
Internet <http://www.rics.org.uk>

Royal Institute of British Architects (RIBA)

Client Advisory Service, Portland Place
London W1N 4AD
Tel 020 7580 5533. Fax 020 7255 1541
E-mail admin@inst.riba.org
Internet <http://www.riba.org>

Chartered Institution of Building Services Engineers (CIBSE)

Delta House, 222 Balham High Road
London SW12 9BS
Tel 020 8675 5211. Fax 020 8675 6554
E-mail info@cibse.org
Internet <http://www.cibse.org>

The information in this publication is based on:

- discussions with the Commercial Property Management Committee and Development and Planning Committee of the RICS
- a survey of high-profile development, investment and letting companies
- workshops attended by key players from the target audience
- other research and literature reviews.

Further reading

Further information on the design and performance of environmentally smart buildings is provided by the following publications.

'Best Practice in the specification for offices'. Second Edition. British Council For Offices, Reading, 1997. ISBN 0 9524131 24

'OSCAR – Office Service Charge Analysis Research'. Jones Lang Wootton, London, 1997

'BREEAM 98 An environmental Assessment For New Offices'. Building Research Establishment Ltd, Garston, 1998

'Justifying the provision of air-conditioning'. Defence Works Functional Standard. Design and Maintenance Guide 07. Ministry of Defence. The Stationery Office, London, 1996. ISBN 0 11 772488

DETR ENERGY EFFICIENCY BEST PRACTICE PROGRAMME DOCUMENTS

The following Best Practice programme publications are available from the Best Practice programme Enquiries Bureaux. Contact details are given below.

Energy Consumption Guides

- 19 Energy use in offices

Good Practice Guides

- 46 Energy efficiency in offices. Heating and hot water systems in offices
118 Managing energy use – minimising running costs of office equipment and related air conditioning
274 Environmentally smart buildings – a quantity surveyor's guide to the cost-effectiveness of energy-efficient offices (currently being processed by BRECSU)

- 276 Managing for a better environment.
Minimising the running costs and impact of office equipment

Good Practice Case Studies

- 21 Energy efficiency in offices. One Bridewell Street, Bristol
308 Naturally comfortable offices – a refurbishment project

New Practice Final Reports

- 102 The Queens Building, De Montfort University – feedback for designers and clients
106 The Elizabeth Fry building, University of East Anglia – feedback for designers and clients

Future Practice R&D

- 59 The energy efficient office of the future

General Information Report

- 30 A performance specification for the energy efficient office of the future

General Information Leaflets

- 11 Energy efficiency in offices
12 Energy efficiency in offices. Posford House, Peterborough
24 All electric, air-conditioned office uses heat pump technology

Introduction to Energy Efficiency

- 6 Introduction to energy efficiency in offices

NatVent® Guide

Natural ventilation for offices

THERMIE Maxibrochure

Energy efficient lighting in offices

The Department of the Environment, Transport and the Regions' Energy Efficiency Best Practice programme provides impartial, authoritative information on energy efficiency techniques and technologies in industry and buildings. This information is disseminated through publications, videos and software, together with seminars, workshops and other events. Publications within the Best Practice programme are shown opposite.

For further information on:

Buildings-related projects contact:
Enquiries Bureau

BRECSU

BRE
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Tel 01923 664258
Fax 01923 664787
E-mail brecsuenq@bre.co.uk

Internet **BRECSU** – <http://www.bre.co.uk/brecsu/>
Internet **ETSU** – <http://www.etsu.com/eebpp/home.htm>

Industrial projects contact:
Energy Efficiency Enquiries Bureau

ETSU

Harwell, Oxfordshire
OX11 0RA
Tel 01235 436747
Fax 01235 433066
E-mail etsuenq@aeat.co.uk

Energy Consumption Guides: compare energy use in specific processes, operations, plant and building types.

Good Practice: promotes proven energy-efficient techniques through Guides and Case Studies.

New Practice: monitors first commercial applications of new energy efficiency measures.

Future Practice: reports on joint R&D ventures into new energy efficiency measures.

General Information: describes concepts and approaches yet to be established as good practice.

Fuel Efficiency Booklets: give detailed information on specific technologies and techniques.

Introduction to Energy Efficiency: helps new energy managers understand the use and costs of heating, lighting, etc.



DEVELOPER

Lower construction cost
Higher rental value
Increased lettability
Increased market edge

INVESTOR

Lower investment risk
Increased lettable area
Improved company image

OCCUPIER

Improved company image
Lower running costs
Improved staff satisfaction

AGENT

Profits when all above
clients gain